

APPENDIX A

Glossary of Terms

The following terms and definitions are provided for the readers of the Loudoun County Bicycle and Pedestrian Mobility Master Plan.

Accessible Pedestrian Signal (APS) – A device that communicates information about pedestrian signal timing in non-visual format, through the use of audible tones (or verbal messages) and vibrating surfaces.

Americans with Disabilities Act (ADA) – The 1990 Federal law establishing the civil rights of people with disabilities. Prohibits discrimination against people with disabilities and requires common places used by the public to provide an equal opportunity for access.

Bicycle – Every vehicle propelled solely by human power upon which any person may ride, having two tandem wheels, except scooters and similar devices. The term “bicycle” in this planning process also includes three and four-wheeled human-powered vehicles, but not tricycles for children.

Bicycle and Pedestrian Facilities – A general term denoting improvements and provisions made to accommodate bicycling and walking, including bike lanes, shared-use pathways, signed bike routes, sidewalks, bicycle parking racks and storage lockers. The term *accommodation* is also used. The term *facility* is commonly used in the transportation industry to refer collectively to the various infrastructure elements that make up transportation systems, stations, etc.

Bicycle and Pedestrian Network - A system of public bicycle and pedestrian facilities that can be mapped and used by bicyclists and/or pedestrians for transportation and recreational purposes.

Bikeway and/or Walkway – A generic term for any road, street, path, or trails specifically designated for bicycle and/or pedestrian travel, regardless of whether such facilities are designated for the exclusive use of bicyclists and pedestrians or are to be shared with other transportation modes.

Bike Lane - A portion of a roadway that has been designated by striping, signing, and pavement markings for the preferential or exclusive use of bicyclists.

Buffer – That portion of a highway, road, or street between the curb-face or edge of the pavement and the sidewalk that provides a spatial buffer between vehicular traffic and pedestrians on sidewalks. Buffers often include landscape plantings such as grass, trees or shrubs, or utility poles, and may also be referred to as the “planting strip,” “landscape buffer,” “tree buffer” or “tree boxes.” Buffers can also include barriers such as highway guide rails (guardrails) or bollards.

Crosswalk – The horizontal portion of roadways, usually at intersections, reserved for pedestrian crossing; it may be marked or unmarked. Three marking patterns using white striping are most common: 1) Double Parallel lines, 2) “Zebra Stripes”: white cross hatches perpendicular to the pedestrian direction of travel, or 3) “Ladder:” perpendicular white cross hatches combined with double parallel lines on the outside edges.



Curb Ramp – A combined ramp and landing to provide access between street level and sidewalk level, usually at intersections or designated crosswalks. ADA accessible ramps must achieve particular design requirements including a running grade no steeper than 1:20.

Detectable Warning – A standardized surface feature built in or applied to walking surfaces or other elements to warn people who are visually impaired of specified hazards.

Median Refuge – An area within an island or median that is intended for pedestrians to wait safely away from travel lanes for an opportunity to continue crossing the roadway.

Midblock Crosswalk – A legally established crosswalk that is not at an intersection.

Pedestrian – A person walking, including traveling by means of a wheelchair, electric scooter, crutches or other mobility aid. Use of the term pedestrian is meant to be comprehensive and includes all disabled individuals as well as runners, joggers, in-line skaters, those using push scooters, those using strollers, carriages, carts and wagons.

Pedestrian Access Route – A corridor for pedestrian travel through the public right-of-way that meets design standards that ensure its accessibility.

Pedestrian Crossing Interval – The combined phases of a traffic signal cycle provided for a pedestrian crossing a roadway in a crosswalk. The interval usually includes the WALK interval plus the pedestrian clearance interval.

Pedestrian Signal Indication – The illuminated WALK/DON'T WALK message (or walking person/hand symbols) that communicates the pedestrian phase of a traffic signal, and their audible and tactile equivalents.

Shared Roadway – A roadway that is open to both bicycle and motor vehicle travel. Unless bicycle travel is explicitly prohibited, all highways, roads and streets are "Shared Roadways." Some Shared Roadways may have wide curb lanes (14' or greater) or paved shoulders, to increase comfort for bicyclists; however in most cases these roads do not have sufficient width to accommodate a Designated Bike Lane.

Shared-Use Path (or Pathway) - A bicycle and pedestrian path separated from motorized vehicular traffic by an open space, barrier or curb. Shared-Use Paths may be along a roadway (often termed "sidepath") or within an independent right-of-way, such as an abandoned railroad bed. Shared-use paths typically accommodate two-way travel as well as pedestrians, in-line skaters, wheelchair users, joggers and other non-motorized path users.

Signed Shared Roadway (Signed Bike Route) – A shared roadway that has been designated by signs as a preferred route for bicycle use.

Sidewalk – That portion of a highway, road or street specifically constructed for the use of pedestrians on the outside edge of the vehicular travel way. Sidewalks are typically, but not always, curb-separated from the roadway and made of concrete, brick, asphalt or other hard surface materials.





APPENDIX B

Bicycle and Pedestrian Level of Service Models

The Bicycle and Pedestrian Level of Service models (BLOS / PLOS) are an evaluation of bicyclist and pedestrian perceived safety with respect to motor vehicle traffic and comfort in using the roadway corridor. It identifies the quality of service for bicyclists or pedestrians that currently exists within the roadway environment. Following the description of these models, the data requirements and data collection and compilation guidelines are also provided.

1) Bicycle Level of Service Model

The statistically calibrated mathematical equation entitled the *Bicycle Level of Service (Bicycle LOS)ⁱ Model (Version 2.0)* will be used for the evaluation of bicycling conditions in the Loudoun. This model is the most accurate method of evaluating the bicycling conditions of shared roadway environments. It uses the same measurable traffic and roadway factors that transportation planners and engineers use for other travel modes. With statistical precision, the *Model* clearly reflects the effect on bicycling suitability or “compatibility” due to factors such as roadway width, bike lane widths and striping combinations, traffic volume, pavement surface conditions, motor vehicle speed and type, and on-street parking.

The *Bicycle Level of Service Model* is based on the research documented by the Transportation Research Board of the National Academy of Sciences footnote. It was developed using data from over 150,000 miles of evaluated urban, suburban, and rural roads and streets across North America. Many urban planning agencies and state highway departments are using this established method of evaluating their roadway networks. These include Anchorage AK, Baltimore MD, Birmingham AL, Buffalo NY, Gainesville FL, Houston TX, Philadelphia PA, Lexington KY, Sacramento CA, Springfield MA, Tampa FL, as well as the Delaware Department of Transportation (DelDOT), Florida Department of Transportation (FDOT), New York State Department of Transportation (NYDOT), Virginia Department of Transportation (VDOT) Maryland Department of Transportation (MDOT) and many others.

Widespread application of the original form of the *Bicycle LOS Model* has provided several refinements. Application of the *Bicycle LOS Model* in the metropolitan area of Philadelphia resulted in the final definition of the three effective width cases for evaluating roadways with on-street parking. Application of the *Bicycle LOS Model* in the rural areas surrounding the greater Buffalo region resulted in refinements to the “low traffic volume roadway width adjustment”. A 1997 statistical enhancement to the *Model* (during statewide application in Delaware) resulted in better quantification of the effects of high-speed truck traffic. As a result, *Version 2.0* has the highest correlation coefficient ($R^2 = 0.77$) of any form of the *Bicycle LOS Model*.

Version 2.0 of the *Bicycle Level of Service Model (Bicycle LOS Model)* has been employed to evaluate collector and arterial roadways within Loudoun County.



APPENDIX D

Level of Service Policy – Supplemental Information for Table 4-2

General Requirements

- a) It is expected that bicyclists and pedestrians will be present and/or desire to use all roads and streets in the county that are in areas where people live, work or enjoy recreation. Moreover, bicyclists and pedestrians are also expected to be attracted to very rural roads as well, to enjoy for recreational bicycling and hiking. As development spreads and increases, it is expected that the demand for bicycle and pedestrian access will only increase.
- b) Estimated future Level of Service calculations made for any roadway, to test its design for the purposes of meeting the Level of Service Standards in this policy, shall use the same data describing the road and its expected traffic volumes that is used to determine its projected level of service for motor vehicle traffic.

In What Cases do Level of Service Standards Apply?

- a) **Planning and Design of Land Developments** (Condition 1): When development proposals are required to evaluate and describe their impacts on existing and future motor vehicle levels of service, they shall also be required to evaluate their impacts on existing and future bicycle and pedestrian level of service. Projects shall be required to mitigate negative impacts to bicycle and pedestrian transportation by making roadway improvements that retain acceptable minimum LOS, or improve existing bicycle and pedestrian levels of service per the target minimums described in Table 4-2. Other mitigation methods may also be considered, including 1) paying impact fees into a County fund that will be used to implement bicycle and pedestrian improvements or 2) providing improvements that create public bicycle and pedestrian access across the site via shared use paths that contribute to the public bicycle and pedestrian transportation network.
- b) **Planning and Design of New Roads** (Condition 1): When new roads and streets are being planned on new rights-of-way (such as Revised Countywide Transportation Plan (CTP) roads or streets within new developments), they will be designed and constructed to achieve a Level of Service meeting or exceeding that for Condition 1. Exceptions may be considered as per the exceptions listed below.
- c) **Planning and Design of Improvements to Roads and Streets in Select Policy Areas** (Condition 2): Within the following Policy Areas, when improvements are planned for existing highways, roads and streets, they should be designed and built to achieve the highest level of bicycle and pedestrian service possible and shall not result in LOS below the minimums listed for Condition 2.
 - All Suburban Policy Areas
 - All Transition Policy Areas
 - All Joint Land Management Areas



- d) **Planning and Design of Improvements to Select Roads and Streets in the Rural Policy Areas** (Conditions 3-3b in Table 4-2): Within the Rural Policy Areas, when improvements are planned for existing roads that are included in the Rural Network, as defined by this Plan, they should be designed and built to achieve the bicycle and pedestrian levels of service target minimums described in Condition 3, and 3a-b in Table 4-2. The design of bikeways and walkways along these roads will take into consideration safety, heritage resources, topography, available right-of-way, and various user groups.
- e) **Planning and Design of All New Roads and Improvements to Existing Roads Near Schools:** Conditions 2a and 3c describe the areas around schools that should be improved to maximize both the number of students who could walk or bicycle to and from school while ensuring their safety using the road and street system.
- f) **Planning and Design of Improvements to Roads and Streets in Incorporated Towns that have adopted LOS target minimums:** It is recommended in this Plan that the Towns of Leesburg, Purcellville, Lovettsville, Round Hill and Hamilton adopt the LOS standards detailed in Conditions 1, 2 and 2a in Table 4-2. Other Towns are encouraged to adopt these same LOS standards or those described in Condition 3b.

On What Roads Do Level of Service Standards Apply and Not Apply?

Generally, LOS standards apply to all roads whose functional classification ranks between residential street and limited access highway, with some exceptions and caveats, as follows:

- a) They do not apply on Limited Access Highways where VDOT or County policy does not allow bicycle or pedestrian access, including the Dulles Greenway. If future limited access highways are planned for Loudoun County, the need for bicycle and pedestrian access along the new highway should be considered as part of the early planning for the road and a determination made regarding the provision of bicycle and pedestrian facilities as a part of the road or road corridor.
- b) LOS standards do apply to the Route 15 Bypass in Leesburg from Route 7 north to its merger with Route 15 King Street. Moreover, while LOS standards do not need to be applied to the Route 7 Bypass in Leesburg, as per CTP policy bicycle and pedestrian accommodations should be considered in this corridor.
- c) LOS standards do not apply to unpaved roads that by policy are to remain unpaved in their ultimate conditions, nor do they apply to alleys, short cul-de-sacs, and private roads.
- d) LOS standards apply only to those roads in the Rural Policy Areas that are identified in this plan as part of the Bicycle and Pedestrian Network.
- e) While LOS grades are not currently available for all existing residential streets and minor commercial streets, LOS standards do apply to these functional classifications of roads.



Making Exceptions to Level of Service Target Minimum Standards

In general, exceptions to the target minimum Level of Service can be made for extenuating circumstances. Some or all of the following factors may be appropriate to consider when seeking a LOS exception under Conditions 1, 2, 3b listed in Table 4-2.

- what is physically feasible given environmental and built constraints, including heritage resources, topography, available right-of-way, etc.
- what is appropriate given adjacent land uses
- if there are parallel routes that meet target minimum BLOS on nearby roads or trails that serve the same transportation connections with a similar level of directness and convenience.
- how various design alternatives impact and balance each mode's quality of service and safety
- what the public desires
- what is cost effective



APPENDIX E

Facility Maintenance Schedule

The first step in developing a maintenance program is to identify what tasks need to be undertaken and who is responsible for each task. The maintenance schedules below lay out potential maintenance tasks, and the likely frequency of these tasks. The County's Office of Transportation Services and VDOT should jointly determine which agency will be responsible for coordinating the execution of on-road bikeway maintenance and who will be the point of contact for citizens with questions regarding maintenance.

Recommended Sidewalk Maintenance Practices

Sidewalk maintenance will be necessary and will be performed by the agency or property owner that owns the sidewalk. Sidewalk maintenance should include periodic inspection, sweeping and edging, mowing during spring and summer months, vegetation trimming, and spot repairs.

Inspection and repair of broken sidewalks

Surface cracking indicates significant advancement of sidewalk deterioration. Extensive freeze and thaw cycles are major culprits for cracking. If the surface is allowed to continue to crack, vegetation may invade the crack and rapidly increase surface deterioration. Drain grates that are located in the path of pedestrian travel can also become a hazard if not properly maintained.

- Periodically check sidewalk surface of major pedestrian routes based on citizen requests and random field checks
- Check sidewalks for heaves and elevation changes that cause tripping hazards
- Vertical displacement of $\frac{3}{4}$ " or greater for 12" of joint
- Horizontal displacements of greater than 1/2" for crack 3' or longer
- Repair cracks early before additional deterioration occurs
- Repair or replace drain grates that create an uneven surface

Drainage Improvements

Flowing or standing water will warp concrete sidewalks and create dips and potholes in roadway shoulders. Good drainage will help prolong the life of an accessible sidewalk. After periods of rain or snow melt, sidewalks and shoulders with puddles will be uncomfortable for pedestrians. Poor drainage may cause pedestrians to walk in the roadway or jump sideways suddenly to avoid a puddle, creating the risk of an accident. Drainage structures that are installed within the sidewalk area must not create a gap of more than 12.5 millimeters ($\frac{1}{2}$ inch) in the direction of travel.



- Ensure that catch basin grates are flush with pavement
- Modify or replace deficient drainage grates with bicycle-safe grates
- Repair or relocate faulty drains at intersections where water backs up onto the curb cut or into the crosswalk

Vegetation

Vegetation encroaching into sidewalks is both a nuisance and a problem. Roots should be controlled to prevent break-up of the surface. Adequate clearances and sight-distances should be maintained at driveways and intersections: pedestrians and bicyclists must be visible to approaching motorists.

- Cut back vegetation to increase pedestrian visibility, where appropriate
- Plant trees that are sidewalk friendly
- Remove hazardous roots (consult an arborist for safe tree root removal)

Sweeping

An inspection and maintenance program based upon citizen request helps ensure that sidewalk litter is regularly picked up or swept. During extended icy conditions, it may not be cost-effective to frequently remove sanding materials; however, they should be swept after major storms in high-use areas and everywhere after the winter season ends.

- Establish a seasonal sweeping schedule per citizen requests
- Sweep sidewalks whenever there is a noticeable accumulation of debris

Winter Season Maintenance

Snow removal will ensure that the minimum five-foot width is accessible to all pedestrians. Sidewalk continuity will be disrupted if a single home or business does not remove snow from their portion of the sidewalk. When this happens, pedestrians are often forced to travel in the street with automobiles, which is especially dangerous in snowy and icy conditions. Property owners should also remove ice or apply appropriate traction materials to prevent slipping. Snow banks often block openings between sidewalks and marked and unmarked crosswalks, especially at mid-block locations. It is essential for highway agencies to note the locations of crosswalks and ensure that pedestrian access to them is maintained. Sidewalks and sidepaths should not be used for long term snow storage, and should be cleared of snow as soon a time, space and weather patterns permit. After snow melts, sidewalks and sidepaths should also be cleaned and swept.



Intersection Maintenance

Intersections should be checked yearly for maintenance of existing pedestrian facilities. Intersections can become pedestrian hazards if the facility controls are in need of maintenance and repair.

- Do spot checks for crosswalk wear and visibility and curb ramp deterioration
- Do spot checks for function of pedestrian signal activators, signal heads, signs and crossing intervals

SUMMARY OF RECOMMENDED PEDESTRIAN MAINTENANCE SCHEDULES

TASK	FREQUENCY	COMMENTS
Regular Inspection	Once a year	Includes all heavy pedestrian traffic sidewalk routes
Sidewalk Sweeping	As needed	Some sidewalks lined by street trees will need extra attention in the fall
Sidewalk repairs	As needed	Repair cracks or other problems on the sidewalks
Sidewalk snow removal	As needed	
Debris removal from sidewalk	As needed	Remove debris from sidewalk such as gravel, broken glass and dirt

Major Pedestrian Intersections

TASK	FREQUENCY	COMMENTS
Regular Inspection	Once a year	Includes pedestrian signal and timing of major pedestrian intersections
Curb Ramp Inspection	As needed	To maintain compliance with ADA
Signs and markings	As needed	Repair or replace signs and markings identified during inspections



Recommended Bicycle Maintenance Practices

Typically, additional on-road bikeway maintenance can be incorporated into regular roadway maintenance schedules, rather than being a separate program. VDOT will be responsible for maintenance of on-road bikeways and sidepaths that are within the roadway right-of-way.

Sweeping

Bicyclists often avoid bike lanes filled with sand, gravel, broken glass and other debris; they will ride in the roadway to avoid these hazards, causing conflicts with motorists. Debris from the roadway should not be swept into the shoulders, bike lanes, or onto sidewalks; nor should debris be swept from the sidewalk onto the roadway. A regularly scheduled inspection and maintenance program helps ensure that debris in the travel way is regularly picked up or swept. During extended icy conditions, it may not be cost-effective to frequently remove sanding materials; however, they should be swept after major storms in high-use areas and everywhere after the winter season ends.

- It is recommended that curbed roadway sections be swept on a regular basis, thereby including bike lane and shoulder sweeping on curbed roadways.
- Provide extra sweeping in the fall in areas where leaves and debris accumulate in bike lanes.
- The County should work with VDOT to establish a sweeping schedule for certain open roadway sections based on citizen requests or installation of bicycle and pedestrian improvements that are key components to the overall network.
- Provide extra sweeping, when necessary, in areas where debris regularly accumulates in bike lanes and wide shoulders areas.

Roadway Surface Repairs

A smooth surface, free of cracks, potholes, bumps and other physical problems should be provided and maintained.

- Respond to citizen reports of maintenance needs in a timely manner
- Repair potentially hazardous conditions as soon as possible
- Prevent the new edge of a road surface repair from running through the center of a bike lane
- Sweep a project area after repairs



Pavement Overlays

Pavement overlays are good opportunities to improve conditions for cyclists. In uncurbed sections, they often offer an opportunity to widen a roadway to provide additional paved space for bicycling. Or they may offer an opportunity to re-stripe a roadway with a layout that includes bike lanes, or a wider striped and paved shoulder. All VDOT pavement overlays should be coordinated with County Bicycle and Pedestrian staff with sufficient lead time to plan and design “quick hit” bicycle service improvements that can be accomplished with pavement striping and minor additions of pavement width.

It is also important that pavement overlays be executed carefully. A ridge should not be left in the area where cyclists ride (this occurs where an overlay extends partway into a bike lane).

- Extend the overlay over the entire roadway surface to avoid leaving an abrupt edge
- Raise drainage inlet grates, manhole and valve covers to within 6 mm (1/4") of the new pavement surface and ensure that grate designs are bicycle-safe
- Sweep the project area after overlay

Vegetation

Vegetation encroaching into bikeways is both a nuisance and a problem. Roadside vegetation that is not a bother to a motorist or pedestrian can be surprise a bicyclist and cause a cyclist to be knocked off their bike or crash. Adequate clearances and sight-distances should be maintained at driveways and intersections: pedestrians and bicyclists must be visible to approaching motorists, rather than hidden by overgrown shrubs or low-hanging branches, which can also obscure signs.

- Cut back vegetation to prevent encroachment

Signs, Stripes & Legends

New bikeway signs and legends are highly visible, but, over time, signs may fall into disrepair and legends may become hard to see, especially at night. Signs and legends should be kept in a readable condition, including those directed at motorists: pedestrians and bicyclists rely on motorists observing the signs and legends that regulate their movements.

- Inspect signs and legends regularly, including reflectivity at night
- Replace defective signs as soon as possible
- Retrace legends, crosswalks and other pavement markings in the spring; in high-use areas, these may require another paint application in the fall



Drainage Improvements

New drainage facilities function well, but may sink and deteriorate over time. Catch basins may need to be adjusted or replaced to improve drainage. A bike-safe drainage grate at the proper height improves bicycle safety. At intersections, there should be no drainage problems in crosswalks. All drainage improvements should be made in conjunction with a scheduled resurfacing or reconstruction effort unless special circumstances exist.

- Raise any deficient catch basin grates to be flush with pavement
- Modify or replace deficient drainage grates with bicycle-safe grates
- Repair or relocate faulty drains at intersections where water backs up into the curb cut or into the crosswalk

Utility Cuts

Utility cuts can leave a rough surface for cyclists if not back-filled carefully.

- Wherever possible, place cut line in an area that will not interfere with bicycle travel
- Back fill cuts in bikeways flush with the surface (humps will not get packed down by bicycle traffic)
- Ensure that cuts parallel to bicycle traffic don't leave a ridge or groove in the bicycle wheel track

Snow Removal

Snow stored on bike lanes and paved shoulders impedes bicycling in winter, however time, space and weather patterns do not always allow for snow removal practices that can provide for the safe operation of motor vehicle, bicycle and pedestrian traffic with the same pass of the plow. A set of primary bicycle and pedestrian routes should be identified where snow removal activities will be applied to bicycle and pedestrian facilities as soon as possible after snowfall. Other areas used for bicycle and pedestrian travel should be cleared later, but as soon as possible after weather patterns warm and bicyclists and pedestrians are again seeking access to the streets. Bike lanes and sidewalks should not be used for storage of large volumes of snow and ice that may remain after most snow has naturally melted and roads are again fully operable for motor vehicles.

- Identify bicycle and pedestrian routes for priority snow removal
- Institute practices that re-open bicycle and pedestrian travel in response to overall weather patterns



SUMMARY OF ON-ROAD BIKEWAY MAINTENANCE SCHEDULE

TASK	FREQUENCY	COMMENTS
Regular Inspection	2 times per year	Includes all on-road bikeways, identify needed repairs of pavement, signs, marking, etc.
Street Sweeping	4 times per year	All streets with bike lanes, extra attention in the fall and spring
Street repairs	As needed	Repair of streets including potholes, cracks or other problems on streets with bikeways
Bike lane snow removal	As needed	Clear snow completely from streets with bike lanes
Debris removal	As needed	Remove debris from on-street bikeways such as gravel, broken glass
Signs	As needed	Repair or replace signs identified during inspections
Markings	As needed, at least every 2 years	Includes all bike lane markings and symbols and crosswalks





APPENDIX F

Pedestrian Improvement Areas: Methodology and List

Pedestrian Improvement Areas (PIAs) include two types of locations - *High Use Areas* and *Problem Areas*:

- *High Use Areas* include locations where significant levels of pedestrian traffic are already present, higher levels of use are desired, or due to latent demand analysis, future land uses and projected development, higher levels of pedestrian activity are expected.
- *Problem Areas* include locations where pedestrian crashes are occurring, where street crossings are difficult or dangerous, where poor pedestrian conditions are a deterrent to pedestrian use, or where pedestrian access is desired but is significantly constrained by large roads, a lack of pedestrian accommodations or other barriers.
- Some locations are both *High Use* and *Problem Areas*.

A list of PIAs (see table below) has been identified to assist the County, VDOT, developers and others in prioritizing locations and activities for pedestrian-related improvements. These areas should receive specialized attention with regard to pedestrian accommodations, safety and security. All road and development projects taking place in or near these locations should address pedestrian needs in a comprehensive manner. The following methodology was used to identify these locations for designation as PIAs:

1. The area was identified during public involvement activities undertaken over the course of the planning process. Comments were received from more than 100 persons during activities that included four public workshops/meetings, regular Citizen Advisory Committee meetings, electronic mail submitted via the project website, and public comments gathered by CAC members or County staff.
2. The area was identified by County staff or the consultant team, or emerged from analysis of existing plans reviewed by the consultants and County staff.
3. The following criteria were used to qualify locations with priority pedestrian needs:
 - All Town Centers in incorporated Towns and emerging suburban communities were included; these centers often include pedestrian generators such as libraries, post offices, Main Street districts, Historic resources or districts retail shopping, County or state service centers, schools, cultural attractions, etc.
 - Village Centers and crossroads in rural areas
 - Areas near public and private schools, colleges or universities
 - Plans for future rail or bus transit stations
 - Areas with mixed uses, including housing, commercial retail and/or employment sites



- Major shopping or employment areas with particularly poor pedestrian accommodations
- Areas around park facilities or community recreation centers; including major new or planned facilities
- Intersections with existing or latent demand, and poor conditions, as determined by consultant field observations
- Intersections with reported pedestrian crashes and obvious need for pedestrian crossing and safety improvements
- Existing and planned interchanges, especially along Routes 7, 15, 28 and 50
- Major crossings of the W&OD Trail
- High use/poor condition road segments, road segments needing traffic calming, and major bridges needing pedestrian improvements

For analytical and prioritization purposes, the sixty-six PIAs were assigned to one of four groups or classes:

- Class 1 includes town centers, village centers, commercial centers (shopping/employment areas), school areas, and future transit centers. These PIAs are typically the largest and most complex in nature. Their needs are often many, including any or all of the following: pedestrian safety improvements at one or more intersections, mid-block crossings, linear accommodations such as sidewalks or widened shoulders, installation of missing curb ramps, traffic calming, connector paths, streetscape and beautification improvements, bike parking, and signage, etc. There are 30 PIAs in Class 1.
- Class 2 includes only intersections. This class is limited to locations where intersection and pedestrian crossing safety improvements are primary. These are typically large intersections where crossing distances are long, accommodations are poor or lacking, and the associated roadways have large volumes of high-speed traffic on multi-lane roadways. Linear accommodations such as sidewalks are often needed as well. Class 2 includes six PIAs, two of which include two adjacent intersections that need attention.
- Class 3 includes only interchanges. This class is limited to locations where interchanges exist or future interchanges are planned. Most existing interchanges have no or very limited pedestrian accommodations. Interchanges have simplified vehicular movement patterns, but operate at high speeds, with uninterrupted traffic flows facilitated by ramps, slip lanes and merge lanes; making design of bicycle and pedestrian crossing-safety accommodations a unique and significant challenge. Class 3 has 22 PIAs.
- Class 4 is a catchall class. It includes W&OD Trail/road intersections, high priority road segments with pedestrian safety issues and three Potomac River bridges that need improved bicycle and pedestrian accommodations. Class 4 has eight PIAs.



The detailed list of PIAs follows:

List of Pedestrian Improvement Areas

<u>Number</u>	<u>Location</u>	<u>Type</u>
	<u>Class 1</u>	
1	Harmony Middle School	School Area
2	Heritage/Simpson/Evergreen Schools	School Area
3	Farmwell Station Middle School	School Area
4	St. Louis Village & Banneker School	School Area
5	River Bend / Potomac Falls	School Area
6	Maple Avenue N	Commercial Center
7	Great Falls Plaza	Commercial Center
8	Sugarland Crossing	Commercial Center
9	World Com Campus East	Commercial Center
10	Broad Run Business Center	Commercial Center
11	Hamilton Town Center/Rte 7 Business	Town Center
12	Round Hill Town Center	Town Center
13	Middleburg Town Center	Town Center
14	Leesburg Town Center	Town Center
15	Purcellville Town Center	Town Center
16	Hillsboro Town Center	Town Center
17	Lovettsville Town Center	Town Center
18	Dulles Town Center	Town Center
19	Cascades Town Center	Town Center
20	Sterling Town Center	Town Center
21	Ashburn Village Center	Town Center
22	South Riding Town Center	Town Center
23	Moorefield Station (Rte 772)	Transit Center
24	Rte 606 Transit Station	Transit Center
25	Bluemont Village	Village Center
26	Lucketts Village	Village Center
27	Waterford Village	Village Center
28	Aldie Village	Village Center
29	Lincoln Village	Village Center
30	Philomont Village	Village Center



<u>Number</u>	<u>Location</u>	<u>Type</u>
	<u>Class 2</u>	
31	Rte 9 & Clarke's Gap Road	Intersection
32	Rte 15 Bypass & Edwards Ferry/Ft Evans Roads	Intersection
33	Rte 7 & Campus/Potomac View	Intersection
34	Rte 7 & Palisade Pkwy	Intersection
35	Rte 7 & Countryside	Intersection
36	Palisade Pkwy & Potomac View	Intersection
	<u>Class 3</u>	
37	Rte 7 & US 15 Bypass	Interchange
38	Rte 7 Bypass & King Street	Interchange
39	Rte 7 & Belmont Ridge Road	Interchange
40	Rte 7 & Lansdowne Blvd	Interchange
41	Rte 7 & Ashburn Village Blvd	Interchange
42	Rte 7 & Algonkian/Atlantic	Interchange
43	Rte 28 & Nokes Blvd	Interchange
44	Rte 267 & Claiborne Parkway	Interchange
45	Rte 28 & Old Ox Road	Interchange
46	US 50 & S Riding Blvd & 621	Interchange
47	US 50 & 609 Pleasant Valley	Interchange
48	US 50 & Willard	Interchange
49	US 50 & 607 Loudoun County Parkway	Interchange
50	US 50 & 659 Gum Spring Road	Interchange
51	US 50 & 659 Relocated	Interchange
52	Rte 28 & Sterling Blvd	Interchange
53	Rte 28 & Waxpool & Church Roads	Interchange
54	Rte 7 & Battlefield Pkwy	Interchange
55	Rte 7 & Crosstrail/Rivercreek Parkway	Interchange
56	Rte 7 & Loudoun County Parkway	Interchange
57	Rte 15 Bypass & Battlefield Parkway	Interchange
58	Sycolin Road & Rte 7 Bypass	Interchange
	<u>Class 4</u>	
59	US 340 Bridge & Road Segment	Bridge
60	Brunswick Bridge	Bridge
61	Point of Rocks Bridge	Bridge
62	Planting Field Road	Road Segment
63	Whites Ferry Road Access	Road Segment
64	W&OD & Ashburn Road	Trail Crossing
65	W&OD & Belmont Ridge Road	Trail Crossing
66	W&OD & Sterling Blvd	Trail Crossing



APPENDIX G: Case Studies

Cascades Town Center

A Suburban Town Center Case Study

Need/Opportunity

Cascades Town Center is a vibrant, walkable shopping and civic center located in the heart of the Cascades and Sterling communities in Eastern Loudoun. Located just north of Route 7 adjacent to the Cascades Parkway, it has good proximity to medium and high-density residential neighborhoods, with thousands of residents living within three-quarters of a mile to the west, north and east of the Center, and hundreds living across Palisades Parkway in the new Jefferson Knolls and Potomac Lakes subdivisions. However, the Center is bounded by four very wide, high-speed thoroughfares that are difficult for pedestrians to cross and generally isolate the Center from its closest customers. While these parkways have been built with sidewalks and sidepaths along them, key intersections lack crossing accommodations, the walkway network has critical gaps, the bikeway network is insufficient, and bicycle parking is absent from the Town Center itself. The mix of housing, shopping, civic services, and employment in the greater Cascades/Sterling Park/Dulles Town Center area is one of the best opportunities in the whole of Loudoun County to demonstrate how a suburban community can be made bicycle and pedestrian friendly. It is also a great place to demonstrate that if enhancements are implemented, significant numbers of local trips now made by motor vehicles could be shifted to human-powered modes. This case study focuses on intersection and bikeway improvements at the northern gateway to the Town Center (Southbank Street and Palisades Parkway) and along Palisades Parkway. With some strategic bicycle and pedestrian retrofits, Cascades Town Center can become an accessible and popular destination for pedestrians and bicyclists and a center of community life.



Bicycle & Pedestrian Issues and Context

The Cascades planned community was the recipient of the “Best Overall Site and Land Planning” award in 1994. The whole community and Cascades Town Center are good examples of community-centered design in Loudoun County. The center includes a number of features that are inviting to pedestrians, such as wide sidewalks and store fronts on the street, benches, street trees and flower boxes along the walkways - a Main Street type setting. However, if you live across the street, you may be as likely to drive to the Staples, the library or lunch at Baja Fresh as walk, because pedestrian accessibility on its periphery is much less attractive than what has been provided in the interior.



Intersection of Southbank Street and Palisades Parkway

The building architecture and visual cues at the corner of Southbank St./Sonoma Way and Palisades Parkway establish this entrance as the primary gateway to the shopping center. Southbank Street leads to the heart of the Center and is opposite Sonoma Way, which provides access into the closest residential neighborhood, Jefferson Knolls. It is a natural pedestrian entry point, and by design, the primary vehicular access as well. However, the intersection currently is not signalized and is difficult for both drivers and pedestrians to negotiate. There is one crosswalk, across the Southbank Street entrance, but none across Palisades Parkway to the sidewalks and homes on the other side.



View south across Palisades Parkway at Southbank St. gateway to Cascades Town Center.

Palisades Parkway is a four-lane divided, minor collector with left and right turning lanes at every intersection including Whitfield Place and Sonoma Way. The median is generally 16-feet, but narrows to 2 feet at Cascades Parkway. The posted speed is 35 mph, however the road was designed and built for 50-mph speeds. The frequency and length of the turning lanes, in addition to the openness of the route, create the feeling that the road is an arterial route and most drivers drive accordingly.

The pedestrian crossing distance of Palisades at Southbank/Sonoma is approximately 115 feet on the west side and 125 on the east side. The 16-foot grass median acts as a protector, and many pedestrians cross one side of the road at a time and wait next to the median-nose for a break in traffic to continue their crossing.

Motorists also have difficulty entering Palisades Parkway from Southbank. The configuration of the intersection and the placement of the stop bar create a number of visual impediments for the motorists trying to turn onto Palisades, which is the only way to reach Cascades Parkway southbound and Route 7. While the stop bar is appropriately in front of the crosswalk, the crosswalk is pulled back so far from Palisades that cars are drawn into or across the crosswalk to see around them. The large width of Palisades, the crown of the road and the slightly lower elevation of Southbank make it very difficult for left turning vehicles to judge the gap in westbound traffic on Palisades. Moreover, because there is no signal at Southbank, cars on Palisades tend to travel at high speed between the signals at Whitfield Place and Cascades Parkway.



Pedestrian crossing at Southbank/Palisades Parkway intersection.

Right turning motorists also have difficulty seeing to get out of Southbank. The vehicles turning left from Southbank (which are many), and vehicles in the right turn lane on Palisades block the view of right turning motorists on Southbank, who are looking left for approaching eastbound traffic. Each of these visual barriers forces motorists to pull further into the intersection to get a clear view of traffic conditions, blocking the existing crosswalk while they wait for a gap in the traffic. But even more importantly, they completely distract motorists from the task of watching for pedestrians. Drivers are pre-disposed to step on the gas and go as soon as a gap in Palisades traffic appears, reducing their ability to avoid hitting a pedestrian in a crosswalk, or bicyclist in the street.

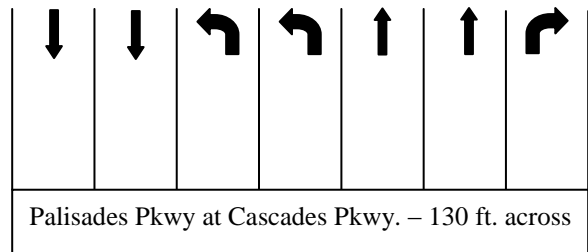
Adjacent Intersections: Palisades & Whitfield Place, Palisades & Cascades Parkway

Whitfield Place provides access to the eastern end of the Town Center as well as the library. Like the Southbank/Palisades crossing, this intersection is very large and is residential on its northern leg. However, Whitfield is signalized, has pedestrian actuators and signalheads, and high visibility crosswalks. The north leg of the intersection has a median planter island with large trees, which emphasizes the fact that the road narrows and changes in character from commercial to residential.



Palisades Parkway looking west from Whitfield Place towards Southbank and Cascades Parkway.

The intersection of Palisades Parkway and Cascades Parkway is also a huge intersection with 125 – 130 foot pedestrian crossing distances across each of its four legs. It provides multiple turning lanes on each leg of the intersection. Coming southbound along the east side of Cascades Parkway, pedestrians must cross seven lanes of Palisades traffic (see cross section at right) to reach the entrance of the Cascades Town Center. The intersection currently does not include accessible ramps at each corner. The mix of turning lanes for each road at this intersection visually chops up the road and creates a large and inconsistent configuration for automobiles, pedestrians and bicyclists to navigate.



Connections Between Cascades Town Center and Surrounding Community

There is tremendous potential to connect bicyclists and pedestrians from surrounding communities to the Cascades Town Center. Adjacent to the Town Center is the Northern Virginia Community College (NVCC) Loudoun Campus, the Eastern Loudoun Regional Library, a Loudoun County Senior Center, a community church, Potomac Falls Post Office, a hotel and other shopping centers. During the summer months, the senior center plays host to a vibrant farmers market.

Within a couple of miles of the Town Center are the Loudoun Tech Center, Dulles Town Center, Claude Moore Park, Algonkian Regional Park, Marymount and Old Dominion University campuses and many neighborhoods such as Cascades, Sterling Park, Countryside, Sugarland Run, and Lowe's Island. All that is lacking are a few important linkages. One of the most critical links needed is a safe crossing of Route 7.



There is an existing sidepath along Cascades Parkway between Palisades Parkway and Route 7. It begins in the Cascades neighborhood and continues south of Palisades Parkway to a point just south of Cranston Street. There is the potential to continue it along the Route 7 access ramp to the west, to a point near Lake Center Plaza, where a bicycle and pedestrian bridge could provide an overpass of Route 7 and connection to the Loudoun Tech Center and roads on the south side of Route 7.

Design Recommendations

Southbank/Sonoma/Palisades Intersection

Installation of a traffic signal and crosswalks at Southbank/Sonoma and Palisades Parkway will greatly enhance the pedestrian's ability to safely cross the street and the motorist's ability to safely exit and enter the Town Center. Median noses should be added to the existing medians to extend them across the sidewalk in such a way as to provide fully protected median refuge islands. Attractive plantings and signage can be added to these median areas to enhance the gateway effect of this intersection.

Further improvement should include dropping the right turn lane from Palisades westbound onto Sonoma Way and the left turn lane from Palisades eastbound onto Sonoma Way. These dedicated turn lanes are unwarranted for such a small-scale residential neighborhood that generates little traffic. The elimination of these turning lanes can reduce the distance required for pedestrians to cross Palisades Parkway by 11-12 feet. This space can help provide the space required to add five-foot bicycle lanes on both sides of Palisades Parkway.

The 85-foot entrance onto Sonoma Way is excessively wide for a small neighborhood street. The wide intersection allows for higher than necessary motorist turning speeds into the development. Recommended enhancements to improve pedestrian crossing at this location are calming of traffic entering the neighborhood to include use of curb extensions, tight curb radii, and a planted median (similar to Whitfield Place).

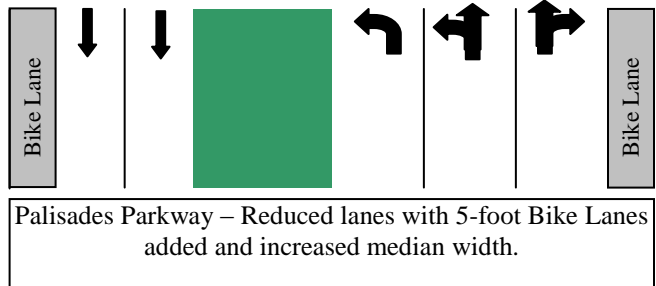


Example of landscaped median, signals and crosswalks at Whitfield Place.

Palisades Parkway

The entire corridor containing Palisades Parkway should be upgraded to promote pedestrian and bicycle uses. In its existing condition, with a wide right of way and existing medians, the corridor has the potential to become an attractive and multi-modal suburban boulevard.

Significant improvements can be executed with minimal changes to the existing curb lines. Lane widths should be reduced to ten feet and short sections of curbs moved back, to allow for installation of bicycle lanes on both sides. Elimination of some turn lanes will allow space to be used for bike lanes or returned to the medians to achieve a consistent look and allow tree planting. The sidewalk on the south side of Palisades should be widened to 6-8 feet, and possibly moved further from the road to add buffer space. The sidepath on the north side of Palisades should be resurfaced in places and realigned to improve utilitarian use. A section of guardrail should be removed. In addition to improving the Southbank/Palisades intersection, the intersection at Palisades and Cascades Parkways can be reconfigured as shown at right, to improve pedestrian crossing at this location.



Improving Connections Between Cascades Town Center and Surrounding Communities

The installation of bike lanes on Palisades Parkway will improve bike access between the Sugarland Run neighborhood and the Town Center. A number of other improvements identified in the Mobility Master Plan will expand linkages all around the Town Center (see list below and broken lines on the map at right).



- With the construction of the pedestrian bridge over Route 7, described earlier, another link can be forged with Claude Moore Park, the Loudoun Tech Center and Dulles Town Center. This link will also become an important north/south link connecting the W&OD Trail with Algonkian Regional Park and the Potomac River. This bridge can connect with a bicycle and pedestrian route along Huntington Square Court and link back to on-street facilities along Cascades Parkway.
- Trails to and around the NOVA Campus and improvements to three intersections will forge links to Sugarland Run neighborhoods and Sterling Park and improve access to the Community College. The intersections are Potomac View & Route 7, Potomac View & Palisades Parkway, and Campus Drive and Route 7. There may be the potential to grade separate a part of the Route 7 crossing east of Potomac View by using the wide median of Route 7 and the difference in elevation of the east and west bound lanes. Paving shoulders along Potomac View from Route 7 to Palisades will enhance bicycle access.

- Gaps in the sidewalk/sidepath system should be eliminated at the west end of Riverwood Terrace, along Palisades near Tripleseven Road (see photo), and in other small locations.
- Sidepaths along both sides of Route 7 should be developed between Countryside Boulevard and the proposed bridge over Route 7 just west of Cascades Parkway. These linkages will extend connectivity to all of the commercial properties that front on Route 7 and to the Dulles Town Center and the residential developments that are mixed into these areas.
- To make the Town Center work for cyclists, bicycle parking needs to be provided within the Center and at other retail and office and civic buildings.



Existing path used by pedestrians and cyclists along west end of Palisades Parkway, near Tripleseven Road.

Cost Factors and Estimates

Recommended improvements for this case study site include a wide range of elements. Many could be implemented independently of each other, or in phases. Thus the potential costs of an improvement project at this site would vary greatly depending on the scope of the effort. One intersection improvement project may cost from \$150,000 to \$200,000, depending on what features were included in the design beyond the addition of traffic signals. Determining the cost of adding bike lanes will require more detailed study. It could vary considerably depending on how many feet of lanes are striped, how many feet of curb line would need adjustment and what the needs would be to re-stripe the travel lanes of the entire roadway. Traffic engineering and analysis costs are not included, nor are the costs of all of the potential improvements listed that can improve the neighborhood connections. The items listed below are intended to provide a range of potential costs related to pedestrian and bicyclist improvements in the study area. Negligible items are below \$5/foot.

Cost Factors and Estimates	
Signal for a 4-way Intersection	\$100,000-\$150,000 each
Bicycle Lane Paving	\$10/foot
Bicycle Lane Striping	\$2/foot
Bicycle Detector	\$1,000 each
Road Marking Symbols	Negligible
Safety Signage	Negligible
Sidewalks	\$30/foot
Pedestrian Signal Heads and Actuators	\$5,000 each
Pedestrian Overpass	\$2-\$6 Million
Bicycle Racks	Negligible



Paeonian Springs: Route 9 & Clarke's Gap Road

A Rural Intersection Case Study

Need/Opportunity

The intersection of Route 9 and Clarke's Gap Road (Route 662) is the primary bicycling gateway between the Washington and Old Dominion (W&OD) Trail and rural routes in the northern part of the County. The Citizens' Advisory Committee for the Plan and numerous public comments identified this location as a primary *hot spot* for bicycle and pedestrian traffic. The combination of high vehicle speeds, turning movements, downhill slopes, limited sight distances and other factors make this intersection difficult for bicyclists and pedestrians to navigate. Because of its proximity to the W&OD Trail, and the generally lower traffic volumes and slower speeds on Clarke's Gap Road, this intersection is unavoidable for bicyclists and pedestrians seeking access to Waterford, Taylorstown and Lovettsville. A number of motor vehicle crashes and two fatalities within the last two years has caused this location to rise to the top of the list of highway safety needs for both the County and Virginia Department of Transportation (VDOT).



Bicycle & Pedestrian Issues and Context

Route 9 and Clarke's Gap Road provide direct highway access to Leesburg and other points east and south for residents in Hillsboro, Lovettsville and Waterford, and commuters from West Virginia. Motorists from these areas travel along Routes 9 and 662 to and from the interchange with Route 7, which is approximately one mile south of Paeonian Springs. Bicyclists and pedestrians in the area must use the same roads to access local businesses, residences and the W&OD Trail.

Currently, Route 9 on each side of Route 662 has 11-foot travel lanes and variable 1-2 foot paved shoulders. Route 662 has no shoulders, no center stripe and 10-foot travel lanes. Neither route provides bicycle or pedestrian accommodations. VDOT has assigned an automobile roadway level of service grade of "F" to Route 9. Bicycle level of service along Route 9 is a "D"; and along Route 662 is "E." West of 662, Route 9 pedestrian level of service is "F"; east of 662 it is "E"; and Route 662 is "D."

Bicyclists and pedestrians traveling between the W&OD and Route 662 must use Route 9 travel lanes or its narrow shoulders, which vary in width depending on the direction of travel. Bicyclists generally share the road with automobiles, while pedestrians walk along the paved or gravel portions of the shoulder. Upon reaching the T-intersection with Route 662, which is located at the bottom of a hill on a curve, they must cross Route 9 to the left to reach Clarke's Gap Road. This requires vigilance in front and behind, looking out for vehicles making the high-speed curve through the intersection or coming out of Clarke's Gap Road.



Roadway navigation is complicated by the presence of several destinations for motorists, pedestrians, and cyclists at or near the intersection. Adjacent to the intersection is a gas station and mini-mart that has multiple driveways configured with wide turning radii for high-speed access into and out of the station. West of the gas station along Route 9, are additional driveways for local business and homeowners. Due to the poor sight distances, and high traffic speeds, motorists must make quick decisions to enter or exit the roadway environment at these destination points, which reduces their ability to notice pedestrians or bicyclists in the roadway.



Driveways of businesses on north side of Route 9



View looking east along Route 9 towards Clarke's Gap Road intersection

There are presently no warning signs to alert motorists to the potential for pedestrian or bicycle activity in the roadway. Due to the short sight distances created by the existing vertical and horizontal curves, motorists can be caught by surprise when they approach pedestrians and/or cyclist in or near the travel way. There are also no signs to provide direction to the W&OD Trail for bicyclists and pedestrians along Clarke's Gap Road or Route 9. These field observations and level of service analyses confirm what daily commuters and local trail users know too well, that this intersection is dangerous and uncomfortable for users of all modes.

Bicycle Level of Service Conditions			Lanes		Traffic Volume	Post Speed	Width of Pavement			Pavement Condition	Level Of Service	
Rt Name	From	To	Thru #	U/D	Existing ADT	mph	W _t	W _l	W _m	(5..1)	Bike (A..F)	Ped (A..F)
Rt 9	Rt 7	Rt 662	2	U	14,000	40	13	0	0-8	4	D	E
Rt 9	Rt 662	Rt 704	2	U	14,000	40	12	0	0	4	D	F
Rt 662	Rt 704	Rt 9	2	U	3,050	45	10	0	0	5	E	D

Detailed Conditions

Route 9 – West of Route 662:

VDOT has assigned motorists' level of service grade of "F" to this portion of Route 9. The roadway configuration generally follows the existing cross section shown:

<u>Existing Cross Section</u>			
0'-2'	11'	11'	0'-2'
Shoulder	Travel	Travel	Shoulder

The dimensions display the pavement width for each component of the road. The shoulders generally drop off steeply, and are gravel or dirt.



Corridor Two - View looking east along Route 9

Route 9 – East of Route 662:

VDOT has assigned a motorist's level of service grade of "F" to this portion of Route 9. The roadway configuration generally follows the existing cross section shown:

Existing Cross Section

1'-2'	11'	0'-5'	11'	1'-2'
Shoulder	Travel	Median	Travel	Shoulder

The dimensions display the pavement width for each component of the road. The shoulders generally drop off gradually, and are gravel or dirt. The median starts near the intersection with Beacon Hill Drive and ends close to the intersection with Clarke's Gap Road.



Corridor Two - View looking south on Route 662 towards Route 9

Route 662 – North of Route 9:

VDOT has assigned a motorist’s level of service grade of “F” to this portion of Route 9. The roadway configuration generally follows the existing cross section shown below:

Existing Cross Section	
10'	10'
Travel	Travel

There are no shoulders present on this roadway. The edge of the road varies, but generally is overgrown with vegetation.

VDOT Design Parameters for Route 9/662 Traffic Safety Project	
Route 9	Route 662
• Design for 50 mph	• Design for 50 mph
• Asphalt Concrete Surface	• Asphalt Concrete Surface
• Lane width: 12 feet	• Lane width: 12 feet
• Graded shoulders: 13 feet (8 feet paved)	• Graded shoulders: 6 feet (not paved)
• Ditch width: 6 feet	• Ditch width: 6 feet
• Turn lane in each direction	• Turn lane for each direction
• No sidewalks	• No sidewalks
• No bicycle paths	• No bicycle paths
• One traffic light	• No change in vertical alignment of roadway
• No change in vertical alignment of roadway	• Minor horizontal adjustment of roadway to accommodate turn lane
• Minor horizontal adjustment of roadway to accommodate turn lane	



Existing VDOT Road Reconstruction Project

Because of the traffic safety issues noted earlier, the Virginia Department of Transportation (VDOT) has begun a formal study of this intersection in preparation for implementing significant traffic safety improvements. VDOT is currently in the preliminary field inspection stage of the design process. The project scope was revised to include provision of pedestrian or bicycle related accommodations on the road. CTP policy requires that roadway improvements being considered for this area accommodate bicycle and pedestrian user needs. VDOT's project at this location presents an immediate opportunity to implement bicycle and pedestrian improvements outlined in this Bicycle and Pedestrian Mobility Master Plan.

The CTP classifies Route 9 as a rural minor arterial, with a planned ultimate condition that includes two 12-foot travel lanes and 8-foot paved shoulders. The CTP classifies Route 662 as a major collector with a planned ultimate design that includes two 12-foot travel lanes and 6-foot graded shoulders. Both routes are designated for bicycle accommodations in the CTP.

Current VDOT Project Status

It is important that Loudoun County coordinate with VDOT to integrate bicycle and pedestrian improvements into the construction documents for this corridor per the adopted CTP and the proposed Bicycle and Pedestrian Mobility Master Plan. There will be a minimal cost increase to work with VDOT now to increase the scope of work for the project, as compared to an effort to retrofit the roadway once the planning and re-construction is complete. VDOT's existing scope of work states that they design the roads for the conditions listed in the table to the right. Given the project timetable there is sufficient time to make changes to the existing project scope and budget.

VDOT Project Timetable	
Milestone	Completion Date
Scoping	01/31/02
Survey	10/12/02
Preliminary Field Inspection	09/30/03
Public Hearing	09/30/03
CTB Approval	02/20/04
Field Inspection	07/30/04
Right-of-Way	08/30/04
Complete Road and Bridge Plans	09/19/04
Advertisement	09/13/05



Design Recommendations

Bicycle and Pedestrian Improvement Recommendations:

Below are recommendations for providing bicycle and pedestrian accommodations along each roadway. They were developed on the assumption that a new traffic signal will be installed as a part of the intersection improvements. These recommendations should be given serious consideration in the scoping, planning and design phases of the project, and construction should result in improved safety and conditions for bicyclists and pedestrians.

Reduce Vehicle Speeds

Both the existing and proposed design and operating traffic speeds are too high for safe pedestrian and bicycle travel along this corridor, especially given current and proposed sight distances, traffic volumes and driveway frequencies, and the future installation of a traffic light.

- Narrow the travel lane widths to 10 feet between Simpson Circle and Beacon Hill Drive
- Provide tight curb radii at existing commercial driveways
- Eliminate one of the Route 9 gas station driveways or try to reconfigure them
- Plant trees along portion of Route 9 between Route 7 and Route 662 to reduce the “wide open” feeling of this portion of the road
- Consider converting the striped median on Route 9 to a vegetated 6-8 foot median with trees, and carrying it through the crosswalk at the intersection. Consider a 2-3 foot concrete median in the western leg of the intersection from Clarke’s Gap to Simpson Circle.
- Provide signs warning motorists of pedestrians and bicyclists in the area
- Provide flashing yellow beacons prior to the signal to warn motorists when the signal is red or turning red
- Install traffic calming devices in the vicinity of Simpson Circle eastbound, and Beacon Hill Drive westbound to both warn and slow motorists (i.e. rumble strips)



Provide Pedestrian Accommodations

- Provide crosswalks with, bicycle/pedestrian activators, at new signalized T-intersection:
 - a) across Route 662 and both right turn slip lanes if provided
 - b) across each leg of Route 9
 - c) if slip lanes are provided for right turns onto and out of Clarke's Gap Road, use "pork chop" islands and crosswalks across the slip lanes
- Provide 8' sidepath along the south side of Route 9 between Clarke's Gap Road and Simpson Circle (consider extending a 6' sidewalk to Sommertime Lane)
- Provide 4'-6' paved shoulder along the north side of Route 9 between Clarke's Gap Road and Simpson Circle
- Provide signs indicating W&OD Trail access route
- Provide a 5-foot graded gravel pedestrian path as a part of the shoulder and/or roadside buffer on the north side of Route 9 east from 662 to Bridge View Court

Provide Bicyclists Accommodations

- Provide 5 foot bicycle lanes on both sides of Route 9 between Route 7 and Clarke's Gap Road
- Provide bicycle loop detector in the left turn lane of Clarke's Gap Road for the movement: Route 662 southbound to Route 9 eastbound
- Provide signs indicating W&OD Trail access route
- Provide lane striping along Route 662 to help guide motorists and bicyclists through the intersection

This will help define the narrow shared use corridor along Route 662 when the roadway narrows back to its typical 20 foot width.

Existing Conditions			Lanes		Traffic Volume	Post Speed	Width of Pavement			Pavement Condition	Level Of Service	
Rt Name	From	To	Thru #	U/D	AADT	mph	W _t	W _i	W _m	(5..1)	Bike (A..F)	Ped (A..F)
Rt 9	Rt 7	Rt 662	2	U	14,000	40	13	2.5	0-8	4	D	E
Add 5' Bike Lane, Add 5' Sidewalk-No Buffer			2	U	24,000	40	17	5	0	5	B	C
Rt 9	Rt 662	Rt 704	2	U	14,000	40	11	0	0	4	D	F
Add 5' Bike Lane, Add 5' Sidewalk-No Buffer			2	U	24,000	40	16	5	0	5	C	C
Add 5' Bike Lane, Add 5' Sidewalk-No Buffer			2	U	24,000	35	16	5	0	5	B	C
Rt 662	Rt 704	Rt 9	2	U	2,300	45	10	0	0	5	E	D

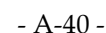


Cost Factors and Estimates

Cost Factors and Estimates	
Land Acquisition	\$25k – \$40k per acre
Bicycle Lane Paving	Negligible
Bicycle Lane Striping	\$2/foot
Bicycle Detector	\$1,000 each
Road Marking Symbols	Negligible
Safety Signage	Negligible
Sidewalks	\$30/foot
Pedestrian Signal	\$5,000 each
Rumble Strips	Negligible
W&OD Signage	Negligible

Implementation Issues/Opportunities

To improve pedestrian and bicyclists safety, it may be necessary for the Loudoun County Board of Supervisors to amend their existing contract with VDOT to require the installation of any pedestrian or bicycle related facilities. It is sufficiently early in the planning process to modify the current intersection and roadway improvement plan. It will be necessary to also engage the following constituencies of any proposed changes: the Loudoun County Bicycle and Pedestrian Citizens Advisory Committee, W&OD Trails users, W&OD officials, adjacent property owners and local residents.



Maple Avenue Corridor - Purcellville

A Small Town Case Study

Need/Opportunity

Maple Avenue N. in Purcellville is a short but active thoroughfare. It provides local access to and from the W&OD Trail, Loudoun Valley High School and shopping centers. Bicycle and pedestrian issues along this road are many, and typical of collector roads in the smaller Loudoun communities. There are significant gaps in the sidewalk system, missing curb cuts at intersections, few opportunities for pedestrian crossings, no bicycle facilities, irregular vehicle lane striping patterns and frequent and poorly defined driveways. It is currently very difficult for students and others to walk on the east side of the street from the school because the sidewalk ends at the fire station. Crossing Main Street (Business Route 7) at Maple is difficult and dangerous. Between Main Street and the W&OD Trail, a distance of a half-mile, there are no marked crossings for pedestrians, yet there are many destinations on the opposite side of the street. Even for motorists, navigating the road is a little unsettling because the lane striping varies every few hundred feet and there are many high use driveways with cars entering and exiting the road in all directions. As with many locations within the County, improvements made to increase bicyclist and pedestrian safety and access can also improve safety and access for motorists.



Bicycle & Pedestrian Issues and Context

Maple Avenue North Corridor

The Maple Avenue corridor under review is bounded by the W&OD Trail to the north and Main Street to the south. The road is contained within the limits of the Town of Purcellville. Maple Avenue is a complex mixture of lanes. The road is essentially a two-lane, undivided road; however, there are multiple left and right turn lanes available to users along the route. Adding to the irregular lane configurations and closely spaced driveways near the shopping centers is the presence of an additional northbound lane located only in front of the school. The road varies in width from twenty-eight feet to forty-two feet. The posted speed limit is 30 mph.



Maple Avenue looking south towards Main Street Intersection.

Sidewalks are intermittent along Maple Avenue. There is some sidewalk on the west side of the street linking the commercial shopping area and an apartment complex, however it does not continue north of Wordsworth Circle to the school, nor does it reach to the Business Route 7/Maple Avenue intersection at the southern end of the corridor. The

sidewalk on the east side of the street only links the fire station and the high school, stopping short of the commercial shopping area near Business Route 7. One of only two striped crosswalks on the entire street is at the W&OD Trail. Currently, pedestrians walk on driveways, sloped gravel shoulders, grass buffers and in parking lots to get between the disconnected segments of sidewalk or to reach an appropriate place to cross the street. Pedestrians must wait for a gap in traffic and make a run for it.

The Washington and Old Dominion Trail

The W&OD Trail currently terminates in Purcellville about one mile west of Maple Avenue near the city center. However, the town's largest shopping centers and a number of restaurants are located at the intersection of Maple and Main (Business Route 7), so Maple Avenue provides the most direct access to the newer shopping areas for W&OD Trail users. Moreover, for many Purcellville residents who live in the southeast quadrant of the Town, Maple Avenue is the only street that provides access to the W&OD Trail for recreational or commuter trips. For residents in the northeast quadrant of the Town, such as the Kingsbridge neighborhood, formal and informal trail connections are provided just east of Loudoun Valley High School.



W&OD Trail connection to Kingsbridge Neighborhood.

Loudoun Valley High School

Loudoun Valley High School is located on the northern end of the corridor adjacent to the W&OD Trail. The high school provides parking for students who drive to school but it does not provide bicycle parking on school grounds. Despite the fact that the W&OD Trail passes within fifty feet of a school driveway adjacent to the school athletic fields, no formal connection is provided to the trail. Sidewalks are located in front of the school with connections that lead to the school buildings. Not all of the connections are ADA compliant. The sidewalk in front of the school was built south along Maple Avenue up to the fire station at which point it ends. Just beyond the fire station is the commercial center located at the intersection of Main Street. With the presence of coffee shops, fast food restaurants, banks, and other commercial stores, this area is a natural destination for students of the high school, and many others who use the corridor. Both the trail and the school generate trips to the two commercial shopping centers that anchor the southern end of Maple Avenue North at Business Route 7.



W&OD Trail crossing of Maple Avenue. School driveway 50' beyond at left.

Maple Avenue/Main Street Intersection

The Virginia Department of Transportation (VDOT) owns Main Street and the associated traffic signal at the intersection with Maple; the Town of Purcellville owns Maple Avenue. The intersection, as designed, allows motorists to turn right on red. A crosswalk traverses Maple Avenue (shown in photo at right), but the sidewalks do not reach the intersection and there are no curb cuts provided along any portions of the intersection for wheelchair ramps. Additionally, signal posts, signal standards, power poles and other appurtenances will complicate future installation of sidewalks and ADA ramps at each corner.



View looking east on Main Street at Maple Avenue and Main Street intersection.

Complicating the movement of pedestrians, motorists, and bicyclists, is the presence of a McDonalds restaurant with a drive through, a drive-through bank, and a gas station. Each of these driveways is located within a few hundred feet of the intersection in addition to the driveways for the shopping center.

Design Recommendations

Improve Pedestrian Accommodations Along Maple Avenue

This corridor has a tremendous need for pedestrian accommodations. Finishing the network of sidewalks along Maple Avenue will encourage increased pedestrian activity and provide a safer experience for them. The sidewalk network should be extended along both sides of Maple Avenue to Main Street to direct pedestrians to a safe crossing at the signalized intersection. Crosswalks should be provided to carry the sidewalks across each driveway cut.



View looking north on Maple Avenue from Main Street intersection. Commercial shopping on left.

The intersection should provide fully for pedestrian crossing across each leg. This would include pedestrian actuated signals and signal heads and adjustments to the signal phase timing to allow pedestrians sufficient time to cross. Wheelchair ramps should be added at each intersection (eight total) to accommodate people with disabilities. Right turn restrictions should be created and enforced when pedestrians are present at the intersection. The curb radii on the northwest corner can be tightened to slow right turning vehicles and make pedestrians waiting on this corner more visible.

One or two mid-block crossings should be considered between Main Street and the W&OD Trail. Near the fire station may be a good location for one of these new crossings, to connect the two shopping centers. Using a raised speed table crosswalk may be a useful crosswalk design to consider.



Re-Stripe Maple Avenue and Add Bicycle Lanes

Five-foot bicycle lanes can be accommodated along Maple Avenue between the W&OD Trail and Main Street. The addition of the bicycle lanes can be accommodated by eliminating the extra lane at the high school, and by eliminating the turn lanes for the commercial center and the residential complex. Should a traffic analysis study conclude that two northbound lanes must be retained in front of the school, a number of other options could be considered:



High School student passing the Fire Station on Maple Ave.

- a) the northbound bike lane can be signed as a shared bicycle/automobile lane
- b) the northbound bike lane can be connected to the sidewalk just north of the fire station, and the sidewalk widened, to provide an off-road bikeway for students to continue at least to the high school, or
- c) the shoulders can be widened and paved for the bike lane to be added to this section of the road

Comprehensive Traffic and Pedestrian Management for Maple Avenue and Commercial Shopping Centers

The presence of the turning lanes provides expectations to drivers that delays will be minimized along the route. This is not possible due to the preponderance of driveways located along the corridor. The gas station, bank, and McDonalds all provide drive through service that is accessed from Maple Avenue. The driveways are wide and located close to each other and to the intersection with Main Street.

These driveways decrease the efficiency of the intersection and the roadway. The closeness of the driveways creates competition for available road space, and causes conflicts with pedestrians and cyclists who must navigate crossing them.



Children run to cross Main Street, headed to McDonald's

It is recommended that a comprehensive plan be developed to reduce the frequency of driveways along the route and to improve traffic flow and pedestrian flow through the commercial areas. Sharing of driveways between the businesses can reduce the conflicts for motorists and pedestrians. Crosswalks should be installed at the mouths of each driveway as improvements are made. As part of a comprehensive plan for improving pedestrian and traffic flow along Maple Avenue, the flows at each commercial shopping center should be addressed as well, to provide a safer environment for all user groups. Improvements in this regard can include sidewalk connections across internal drives and parking lots to link the sidewalks on Maple Avenue with the walkways along the shopping center storefronts.



Cost Factors and Estimates

The items are listed to provide estimates for potential project improvements. It will be necessary to complete a more comprehensive engineering analysis of the corridor before proceeding ahead with any recommendations. These items are shown to provide a general sense of the costs to provide various pedestrian and bicyclist improvements along the corridor. It is not intended to be a conclusive cost estimate. Negligible items generally cost less than five-dollars a foot for installation.

Cost Factors and Estimates	
New Crosswalks	\$5,000 each
Bicycle Lane Striping	\$2/foot
Bicycle Detector	\$1,000 each
Road Marking Symbols	Negligible
Safety Signage	Negligible
Sidewalks	\$30/foot
Pedestrian Signal	\$5,000 each
Rumble Strips	Negligible
W&OD Trail Signage	Negligible

Implementation Issues/Opportunities

To improve pedestrian and bicyclist safety, it will be necessary for the County to work with the Town of Purcellville, the existing businesses, school administrators, and residents to establish clear improvement goals and requirements. It will be necessary to work with VDOT to determine final crosswalk locations, lane configurations, and light timing sequences at the Main Street/Maple Avenue intersection. A traffic corridor study should be performed along the Maple Avenue corridor to determine the feasibility of reducing driveways, reducing lanes, changing lane widths, adding bicycle lanes, and providing additional pedestrian crosswalks and sidewalks.



With dinner in hand, crossing Maple Avenue to head home.

Currently VDOT, in conjunction with the Town of Purcellville, is conducting an analysis of the signal light timing. Adjustments have been made to the existing signal timing to try to improve the intersection efficiency during school commuting hours. If it is determined that additional signals are required at the intersection, a complete intersection upgrade may need to be performed. This upgrade would require the purchase of additional right-of-way to accommodate signal poles. If this scenario occurs, it will be an opportune time to address the bicycle and pedestrian shortcomings at the intersection.

The Town of Purcellville may be typical in regard to the issues that smaller Loudoun communities face to create pedestrian- and bicycle-friendly intersections and roads. Small towns, with smaller tax bases, and jurisdictional road ownership issues, can face large challenges just to improve a short street segment. However, small towns are also likely to have a core of dedicated citizen and elected leaders for whom Town pride and economic considerations are a driving force...and where there is a will, there is often a way.

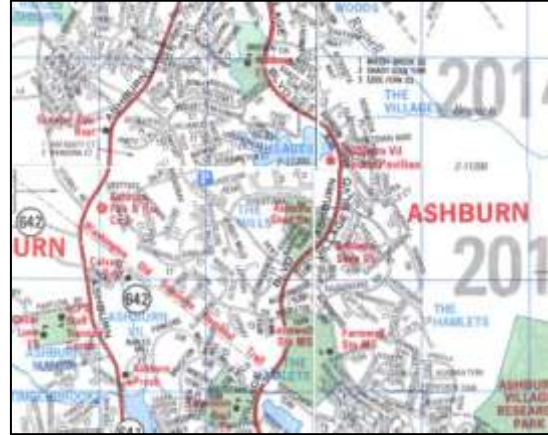


Farmwell Station Middle School

A School Access Case Study

Need/Opportunity

Farmwell Station Middle School is located in Ashburn in the eastern portion of Loudoun County. The school's central location to residential development and the Washington and Old Dominion Trail (W&OD) is ideal for promoting a walk and bike to school program that can reduce busing needs and improve health for the students. The children who live on the east side of Gloucester Parkway currently walk to the school with assistance from a crossing guard at the intersection with Rainsboro Drive. Unfortunately, once the Gloucester Parkway extension is completed, thereby increasing automobile traffic, the Sheriff's Office will no longer provide a crossing guard for the parkway. Once the crossing guard is removed, the school will begin to bus the children from neighborhoods across the street. With the installation of a traffic signal at the school and with the implementation of a safe walk and bike to school program, Farmwell Station Middle School can increase the numbers of students walking and bicycling to school instead of reducing them.



Bicycle & Pedestrian Accommodation Issues and Context

The Broad Run District of the Loudoun Board of Supervisors receives frequent reports of frustration from residents who are having difficulty crossing Gloucester Parkway and Ashburn Village Boulevard to reach various destinations. New home construction and rising traffic volumes in the immediate neighborhoods surrounding the school have led to a heightened awareness of the need to provide safe and accessible pedestrian and bicycle facilities on Gloucester Parkway and Ashburn Village Boulevard.

In addition to the great potential for increasing student walk/bike trips to school, the school facilities themselves (playground, fields, and classrooms) are a great destination for the entire community. The surrounding neighborhoods are being built with extensive networks of sidewalks on both sides of the street leading up to Gloucester Parkway and Ashburn Village Boulevard; all that remains is to improve the connections across the parkway and boulevard.

Farmwell Station Middle School

The school is located next to the W&OD Trail, and is adjacent to medium-density neighborhoods that are contained within the walk zone surrounding the school. Currently children who live within the 0.8-mile walk zone, and who live on the eastern side of Ashburn Village Boulevard, walk to school. Students living in neighborhoods north and west of Ashburn Village Boulevard are bussed to school.



The Sheriff's Office provides a crossing guard at the intersection of Gloucester Parkway and Rainsboro Drive to facilitate crossing of children across Gloucester Parkway. It is generally school policy to not place crossing guards on roads that are four lanes or wider, and do not have crosswalks or signalization. An exception has been made for this intersection because the average daily traffic on Gloucester is less than 1,500 cars/day. This location will not be as convenient for students to cross who live immediately across and south of the school once the development is finished. Once traffic increases on Gloucester Parkway, the crossing guard will be eliminated at Rainsboro Drive and students will be bused to the school from the neighborhood across Gloucester Parkway.



Entrance to Farmwell Station Middle School at Gloucester Parkway and Runnymede Terrace

In addition to student trips to and from school, the school property itself is a destination that dog walkers, residents, and children use because it contains a large athletic field for recreational activity. The school does not provide any bicycles racks for students or recreational users of the fields.

W&OD Trail Access and Security

The W&OD Trail is located along the western boundary of the school property and it provides excellent connections into adjacent neighborhoods that are contained within the 0.8-mile safe walk zone surrounding the school. The trail provides a grade-separated crossing of Ashburn Village Boulevard via an underpass that provides a direct connection to the Dominion Trail Elementary School and to the Mills neighborhood north and west of Ashburn Village Boulevard.



W&OD underpass looking east towards Farmwell Station Middle School

There are community concerns about security on the W&OD Trail in the vicinity of the school. A number of community meetings were held upon the



Existing narrow dirt path ("goat path") leading from W&OD into neighborhood.

opening of the school where the residents discussed security concerns with school officials and law enforcement officers. The community decided that it was not desirable to allow students to utilize the underpass to cross beneath Ashburn Village Boulevard from the Mills neighborhood west and north of the school. Students who live on the north and west side of the underpass must now take a bus to school. This policy has removed a large segment of the student body from being able to walk or bike to school along a trail separated from automobiles.

In addition to concerns about security on the trail, a lack of formal linkages between the trail and the neighborhoods has resulted in people creating their own “goat paths”, which are often narrow and overgrown with brush. The existence of “goat paths” demonstrates a desire by residents in the community to have direct links to the W&OD Trail. These informal trails end up creating a feeling of insecurity that can be eliminated if they are transformed into official access points to the W&OD.

Gloucester Parkway

The school is bounded by Gloucester Parkway to the east, which carries approximately 1,000 cars/day. The neighborhoods on either side of the road are residential, consisting of high-density townhouse and apartment style development. Housing continues to be constructed along the parkway. Future plans call for the extension of Gloucester Parkway to the Dulles Town Center. As development and the parkway construction extend east, traffic will increase making it more difficult for residents to cross Gloucester.



View looking south on Ashburn Village Boulevard looking at W&OD overpass.

Crosswalks and signals are not provided in front of the school at Runnymede Terrace or at nearby Rainsboro Drive. The closest crosswalk is located at the intersection of Ashburn Village Boulevard.

Typical Cross Section – Gloucester Parkway

5'	6'	11'	11'	11'	20'	11'	11'	11'	6'	5'
Walk	Buffer	Shoulder	Travel	Travel	Median	Travel	Travel	Shoulder	Buffer	Walk

- Posted Speed = 35 mph
- Four Lanes-Divided
- No Bicycle Lanes
- Sidewalks Throughout
- Wide Median
- Right and Left Turn Lanes
- 120' Right of Way

Currently, there are no plans for the installation of crosswalks, signals, or bicycle lanes along this route or at the school entrance. Additionally, there are no existing pedestrian or bicycle warning signs along the road with the exception of school zone flashing warning beacons.

Ashburn Village Boulevard

The school is bounded by Ashburn Village Boulevard to the north and west. This boulevard is classified in the Revised Countywide Transportation Plan (CTP) as a major collector road. Currently Ashburn Village Boulevard conveys approximately 14,000 cars/day. The road does not provide for mid-block crossings for pedestrians, nor does it provide warning signs or bicycle lanes. It is built with sidewalks, however they do not carry across the bridge where Ashburn Village Boulevard crosses over the W&OD Trail.



Typical Cross Section – Ashburn Village Boulevard

5'	5'	11'	11'	12'	11'	11'	5'	5'
Walk	Buffer	Travel	Travel	Median	Travel	Travel	Buffer	Walk

- Posted Speed = 35 mph
- Four Lanes – Divided
- No Bicycle Lanes
- Sidewalks Throughout (except bridge)
- Right and Left Turn Lanes
- 120' Right of Way

Gloucester Parkway/Ashburn Village Boulevard Intersection

Each leg of the intersection of Gloucester Parkway and Ashburn Village Boulevard is designed with an un-signalized right turn lane. Each leg provides a corner pedestrian refuge island. Unfortunately, a long merge area is provided to the motorist after making the turn, which encourages higher motorist speeds. There are no pedestrian warning signs preceding these intersections, and there are no measures provided to force motorist to slow down before making the turn. Motorists traveling north on Ashburn Village Boulevard turning right onto Gloucester Parkway have a limited sight distance of the pedestrians in the crossing located in the middle of the turn. This intersection is not utilized for school crossings because of the un-signalized turns.



Ashburn Village Boulevard – Un-signalized right turn slip lane at Gloucester Parkway.

Design Recommendations

Create a Safe Routes to School Program



This school is a prime candidate for adopting a *Safe Routes to School* program because it has a significant amount of residential development located within the 0.8-mile walk zone of the school. Bike/walk trip potential is further magnified by with the presence of the W&OD Trail passing within 100 feet of the school. This school could have a high percentage of students and staff bicycling and walking to school with some physical and security improvements that a Safe Routes to School Program can facilitate.

Safe Routes at Farmwell Station Middle School can be modeled upon a similar effort recently implemented at the Rolling Terrace Elementary School in Silver Spring, Maryland. The program includes the following activities:

- Creating a safe routes to school leadership team
- Documenting existing conditions, trip patterns, and agency policies
- Gathering input from teachers, administrators, students, and parents



- Developing a list of strategies and activities to increase safety and security for students walking and biking
- Prioritizing a list of physical improvements and implementation strategies
- Implementing the programmatic and physical improvement priorities

Gloucester Parkway

Planning should begin soon for the installation of a traffic signal at the intersection of Gloucester Parkway and Runnymede. Crosswalks and median refuge islands should also be provided. This will have two benefits. First, it will control access for motor vehicles during the school commute time periods, including buses, staff and parent driven vehicles dropping off/picking up students. The light should be set up to allow free flowing traffic along Gloucester unless a pedestrian, bicyclist or automobile desiring to cross the parkway actuates it. The second benefit is that it will strengthen the link between the school and the residential neighborhood across the street. This will



Gloucester Parkway south and east of the school.

enable those students who currently walk to school to continue to walk to school. It will save the district money by eliminating a need to bus students across the parkway. Additional improvements in this area should include widening the sidewalk on the west side of Gloucester between the school and Ashburn Village Boulevard, and adding curb cuts and bicycle parking on school property.

Gloucester Parkway can be further improved by planting trees along the median and the buffer zones between the road and sidewalks. The road is sufficiently wide enough to accommodate five-foot bicycle lanes on either side by narrowing travel lanes to ten feet and by narrowing the median accordingly. The addition of these features will signify to motorists that they are entering a residential neighborhood, which can help to reduce traffic speeds.

Pedestrian refuge islands can be constructed at crossing points within the median along the parkway. These crossings provide space for pedestrians to wait who prefer or are only able to cross one direction of travel at a time. In the future, Gloucester should be designed with a combination of crosswalks at signalized intersections and mid-block crossings. Warrant studies for traffic signals at crosswalks should be requested as the traffic increases on the roadway and signals should be installed where they are proven necessary to enable safe pedestrian crossings of the roadway.

W&OD Trail Access and Security

The concerns regarding trail security that the community has expressed can be resolved in a number of different ways. Formalizing the “goat paths” between the trail and the neighborhoods such as that provided between Tippecanoe Terrace and the school can enhance the appearance, and therefore the feeling, of security. Small landscaping style lights can be installed that will provide lighting that will not be intrusive to neighboring homes. As with any trail, it will be important to maintain brush and undergrowth along the trail. If more bicycling to school is going to be encouraged, additional bike parking will need to be provided at the school to secure the bicycles. It should be covered, attractive and close to the doors that students use to enter and exit the building.



Formal W&OD trail connection between Tippecanoe and the school.

Concerns regarding security at the underpass of the W&OD Trail with Ashburn Village Boulevard can be resolved by providing lighting beneath the bridge. Collaboration between neighborhood associations, community residents, W&OD Trail officials (such as The Friends of the W&OD Trail), school officials, and public safety officials can yield a working group of citizen volunteers who can assist with policing of the trail before and after school. The Friends of the W&OD Trail currently organize trail patrols in different portions of the county.

Gloucester Parkway/Ashburn Village Boulevard Intersection

The shopping mall on the north side of the intersection of Gloucester Parkway and Ashburn Village Boulevard is a major local destination for residents, including many students after school. The intersection is designed to accommodate high-speed right turns that are not signal-controlled. There are no warning signs preceding these turns to notify motorists that pedestrians may be present in the crosswalk. There is a lengthy merge area following the crosswalk, which encourages higher motor vehicle speeds. Short sight distances along each right turn lane further complicate the pedestrian safety issue.



Right turn with pedestrian crossing in middle – Poor sight distance.

It is recommended that signs be added prior to the intersection to warn motorists of the potential presence of pedestrians in the intersection. Pedestrian detectors could identify pedestrians within the crosswalk, which could in turn activate a flashing warning signal to motorists. The crossing should have a painted crosswalk to provide visual clues to motorists and pedestrians. Rumble strips could be installed prior to the intersection to encourage motorists to slow their approach speeds. Finally, the speed should be reduced to 20 mph to increase the safety of the pedestrians at the crossing.

Cost Factors and Estimates

The items listed below provide estimates for potential project improvements. It will be necessary to complete an engineering analysis of the corridor before proceeding with any recommendations. These items are shown to provide a general sense of the costs for various pedestrian and bicyclist improvements at the site. It is not intended to be a comprehensive cost estimate. Negligible items generally cost less than five-dollars a foot for installation.

Cost Factors and Estimates	
New Traffic Light	\$100,000-\$150,000 each
New Crosswalks	\$5,000 each
Bicycle Lane Striping	\$2/foot
Bicycle Detector	\$1,000 each
Road Marking Symbols	Negligible
Safety Signage	Negligible
Sidewalks	\$30/foot
Pedestrian Signal	\$5,000 each
Rumble Strips	Negligible
W&OD Trail Signage	Negligible

Implementation Issues/Opportunities

To improve pedestrian and bicyclist safety, it will be necessary for the Loudoun County Public Schools' Department of Transportation to work with the existing homeowners associations, local principal, parents, VDOT, and local developers to establish clear improvement goals and requirements. It will be necessary to be proactive in regards to the traffic signal, due to the VDOT requirements to perform a warrant study before installing any traffic signals. It may take pressure from the community and County officials to get approval for traffic signal installation before the completion of the parkway. It is recommended that the installation of a signal at the school driveway be accomplished by the time the current residential development is fully occupied, or soon after. At the outside, a signal should be installed before the Gloucester is extended further east to accommodate any further development. The goal should be to retrofit the Gloucester/Runnymede intersection as soon as possible to enable it to operate safely for bus access and egress and become the most efficient and safe crossing point to be staffed by crossing guards for students bicycling and walking to school.



Right turn with pedestrian crossing in middle – long merge with Gloucester.

